Design, Construction and Installation

WAC 296-826-300

Section Contents

YOUR RESPONSIBILITY:

To make sure containers and tanks used for storing, distributing, or transporting anhydrous ammonia meet design, construction and installation requirements

CONTAINER LOCATION AND MARKING

-Continued-

Design, Construction and Installation

WAC 296-826-300

Section Contents

Design, Construction and Installation

WAC 296-826-300

Rule

CONTAINER LOCATION AND MARKING

WAC 296-826-30005

General specifications

You must

- Locate containers either:
  - In buildings or parts of the building provided for ammonia storage

    or
  - Outside, away from densely populated areas.
- Locate containers according to Table 1, Minimum Distances for Container Location.

Table 1
Minimum Distances for Container Location

Minimum Distances (feet) from Container to:			
Nominal Capacity of Container	**Line of Adjoining Property Which may be Built upon, Highways & Mainline of Railroad**	**Place of Public Assembly**	**Institution Occupancy**
Over 500 to 2,000	25	150	250
Over 2,000 to 30,000	50	300	500
Over 30,000 to 100,000	50	450	750
Over 100,000	50	600	1,000

You must

- Make sure containers are located to meet all of the following:
  - Away from readily ignitable materials such as weeds, long dry grass, and waste.
  - So there's no adverse impact on employee health through unnecessary exposure.
  - At least 50 feet away from dug wells and other sources of potable water.
  - If the container is a part of a water treatment installation, then this requirement doesn't apply.
- Maintain legibility of all container and valve markings.

Design, Construction and Installation

WAC 296-826-300

Rule

WAC 296-826-30010

Specifications for portable DOT containers

IMPORTANT:

This section applies to systems that use cylinders, portable tanks (DOT-51), or "ton containers" (DOT-106A, DOT-110A), constructed according to DOT specifications.

You must

- Locate containers aboveground, never buried below the ground.
- Put containers on firm ground or secure them.
- Guard against settling on the outlet piping by using a flexible connection or a special fitting.
- Protect containers from all of the following:
  - Ignitable debris
  - External damage including corrosion
  - Heat sources, like radiant flames and steam pipes
  - Moving vehicles.
- Prohibit the use of heat to raise the container pressure.

Design, Construction and Installation

WAC 296-826-300

Rule

WAC 296-826-30015

Nonrefrigerated stationary containers

You must

- Construct and test containers according to the Unfired Pressure Vessel Code.
- Make sure the minimum design pressure of the container is 250 psig
- Make sure all containers with a capacity exceeding 250 gallons are constructed to meet one or more of the following:
  - Stress relieved after fabrication according to the Unfired Pressure Vessel Code
  - Have stress relieved cold-formed heads
  - Hot-formed heads

WAC 296-826-30020

Refrigerated storage

You must

- Make sure the minimum design temperature is the same as the refrigerated temperature of the tank.
- Construct and test containers, with a design pressure exceeding 15 psig, according to the Unfired Pressure Vessel Code.
- Select construction materials from those listed from API Standard 620, 4th Edition 2002, Recommended Rules for Design and Construction of Large, Welded Low Pressure Storage Tanks.
- Construct tanks with a design pressure with 15 psig or less according to API Standard 620, 4th Edition, 2002.
- Use ASME Code as a guide in the selection of austenitic steels or nonferrous materials, if used at the design temperature.

Design, Construction and Installation

WAC 296-826-300

Rule

WAC 296-826-30025

Systems mounted on trucks, semi-trailers, and trailers

You must

- Construct and test containers, when transported within the state of Washington, according to both of the following:
  - A minimum design pressure of 250 psig
  - The Unfired Pressure Vessel Code.
- Construct containers used for interstate transport according to DOT regulations.
- Make sure the shell or head thickness of any container is at least 3/16 of an inch.
- Make sure electrical lighting circuits meet all of the following:
  - Have suitable over-current protection, such as fuses or automatic circuit breakers.
  - Are suitably secured, insulated, and protected against physical damage.
  - Have wiring with sufficient carrying capacity and mechanical strength.
- Use only electric light.

WAC 296-826-30030

Systems mounted on farm trucks or trailers for transporting ammonia

You must

- Construct and test containers, with a design pressure exceeding 15 psig, according to the Unfired Pressure Vessel Code.

WAC 296-826-30035

Systems mounted on farm equipment for ammonia application

You must

- Construct and test containers according to the Unfired Pressure Vessel Code.

WAC 296-826-30040

DOT containers

You must

- Make sure containers meet DOT specifications.

Design, Construction and Installation

WAC 296-826-300

Rule

NONREFRIGERATED CONTAINERS

WAC 296-826-30045

Installation

You must

- Provide a minimum distance of 5 feet between aboveground and underground containers that have more than a 1,200 gallon capacity each.
- Protect containers from floating away, in areas with a potential for high flood waters, by providing either:
  - Secure anchorage

    or
  - Adequate pier height.
- Follow Table 2 for aboveground, nonrefrigerated containers.

-Continued-

WAC 296-826-30045
Installation (continued)

Table 2
Aboveground Nonrefrigerated Container Requirements

If you have	Then
Above ground containers	• Provide one of the following: – Substantial reinforced concrete footings and foundations **or** – Structural steel supports mounted on reinforced concrete foundations. • Make sure the reinforced concrete foundation meets all of the following: – Extends below the established frost line – Is of sufficient width and thickness to support the total weight of the containers and contents – Has the lowest point of the tank at least 18 inches above the ground. • Make sure the footings meet all of the following: – Extend below the established frost line – Are of sufficient width and thickness to support the total weight of the containers and contents.
Floating type foundations on containers installed aboveground	Make sure they are designed to adequately support the tank, contents, and pumping equipment.
A horizontal, above ground container	• Mount the container on a foundation that permits expansion and contraction. • Prevent the weight of excessive loads from resting on the supporting portion of the shell. • Provide saddle bearing that extends over at least 1/3 the circumference of the shell. • Prevent corrosion on the portions of the container in contact with the foundations or saddles.

-Continued-

Design, Construction and Installation

WAC 296-826-300

Rule

WAC 296-826-30045

Installation (continued)

You must

- Follow Table 3 for underground, non-refrigerated containers.

Table 3
Underground Nonrefrigerated Container Requirements

If you have	Then
Underground containers	• Set the containers on firm foundations or earth – Surround containers with soft earth or sand well tamped into place. • Make sure the top of the container is at least one foot below the surface of the ground. – If ground conditions make this impractical, use precautions to prevent physical damage to the container. **Exemption:** It isn't necessary to cover the portion of the container where a manhole and other connections are attached. • Securely anchor or weight containers when necessary to prevent floating. • Have a protective corrosion resistant coating applied before it's placed underground that's both of the following: – Satisfactory to the authority having jurisdiction **and** – Equal to either hot dip galvanizing or 2 preliminary coatings of red lead followed by a heavy coating of coal tar or asphalt. • Lower containers onto firm foundations without damaging the protective corrosion resistant coating.

WAC 296-826-30050

Reinstallation

You must

- Prohibit the reinstallation of nonrefrigerated, previously installed underground, containers unless they meet both of the following:
  - Pass a hydrostatic pressure retest using the original pressure specified by the Unfired Pressure Vessel Code under which the tank was constructed

    and
  - Show no evidence of serious corrosion.
- Maintain a corrosion resistant coating on reinstalled underground containers.

REFRIGERATED STORAGE TANKS

WAC 296-826-30055

Installation

You must

- Support tanks on noncombustible foundations designed for the type of tank.
- Provide protection against flotation or other water damage, where high floodwater might occur.
- Prevent the effects of freezing and consequent frost heaving, in tanks used for product storage at less than 32°F, by providing either support or heat supply.

-Continued-

Design, Construction and Installation

WAC 296-826-300

Rule

WAC 296-826-30055

Installation (continued)

You must

- Prevent accidental discharge of liquids from spreading into uncontrolled areas by providing, to the area surrounding a refrigerated tank or group of tanks, one of the following:
  - A drainage system provided with at least a one percent slope that terminates in an impounding basin with a capacity as large as the largest tank served

    or
  - A diked enclosure with a capacity as large as the largest tank served.
- Meet, when using a diked enclosure or an impounding basin in a drainage system, the following requirements:
  - The wall is made of earth, steel, or concrete. If made of earth, meet both of the following:
    - The top is flat and at least 2 feet wide

      and
    - There's a stable slope consistent with the angle of the earth used
  - Design the wall to be both:
    - Liquid tight

      and
    - Able to withstand the hydrostatic pressure and the temperature.
- Provide for drainage of rain water, that doesn't permit the release of ammonia, from diked or impounding areas.

Note:

- It's recommended that the ground in an impounding basin or within a diked enclosure be graded so that small spills or the early part of a large spill will accumulate at one side or corner contacting both:
  - A relatively small area of ground

    and
  - Exposing a relatively small surface area for heat gain.
- Shallow channels in the ground surface or low curbs of earth can help guide the liquid to these low areas without contacting a large ground area.

WAC 296-826-30060

Reinstallation

You must

- Make sure moved and reinstalled containers of a size to require field fabrication are reconstructed and reinspected to:
  - Meet the original Unfired Pressure Vessel Code under which the tank was manufactured and do the following according to the same code:
    - A pressure retest
    - Any necessary rerating.

Notes